SECURITY MONITORING SYSTEM PROTOTYPE TOKO EMAS FAMILY S BASED INTERNET OF THINGS

Ginda Subagja[1], Dedeng Hirawan., S.Kom.,M.Kom.[2]

[1,2] Program Studi Teknik Informatika
Fakultas Teknik dal Ilmu Komputer Iniversitas Komputer Indonesia
Jl. Dipatiukur No. 112-114 Bandung
E-mail : Ginda_s@outlook.com[1], dedeng@email.unikom.ac.id,

ABSTRAK

Monitoring System-based internet of things is a system that could monitor a place remotely through an internet connection that is connected with monitoring devices that have been installed int he place to be monitored. Security monitoring system prototype constructed will applied to monitor the safe storage areas in Toko Emas Family S.

The research site has some problem with electrical power sources, because of frequent lights out unexpectedly, to apply a monitoring system to monitor the security, electrical power source is a basic requirement to keep the system running when the conventional power is off.

This prototype monitorig system has a alternative power that is power from the solar panel is stored in batteries for backup system, in case of a power outage. This research uses a prototype methode to developing the system and testing the web application with a black box, and beta testing is used to figure out the alignment with requirement, and for hardware test, and the hardware test is used to test the quality of the prototype of monitoring system.

This prototype can be developed into a greater scale of monitoring system in home, or a company that requires a monitoring system security.

1. INTRODUCTION

Monitoring is an activity in the State of the monitor that happen on a site, including the home, storage of valuables such as a safe storage room in the apply to this research. Problems occurred at the site of the research is, it is not terpantaunya of storage space in the store safe Gold Family S at the time was abandoned by its owner or time off, other problems that occur are often blackout on where this research is applied, so that if a monitoring system will not always ready to monitor. Therefore in the add an alternative power in power by solar panels to provide backup power in the event of a power outage. Therefore, a Prototype Monitoring System Stores Gold Family-based Internet of Things to perform monitoring in safe storage space at "Toko Emas Family S".

Development of software on this research using the method of Prototype in order to speed up the development.

1.1 Internet of Things

Internet of Things, also known with the abbreviation of IoT, is a concept that aims to extend the benefits of internet connectivity linked on an ongoing basis. As for capabilities such as data sharing, remote control, and so on, as well as on objects in the real world. Examples of everyday objects or electronic items that we often meet on condition that everything connected with the internet and have sensors that are embedded and are always active.

1.2 Security

Security comes from a scure word that mean protected from danger, so the sense of security is a State of affairs which feel safe and protected from harm.

In this study the security applied to a storage room safe, so that the owner of the company could be more feel safe at the moment the place abandoned.

1.3 Solar Power Plant

Solar power plant is a power alternative, the solar power that comes from the Sun does not have the limitation of in the country of Indonesia, because it includes a tropical Country so almost one full year of Sun will continue to shine in this land.
Research on the place of PLTS deployment aims to provide an alternative power in the event of a power outage, so that monitoring continue to run at a time when conventional electricity there is no.

1.4 Raspberry Pi

Raspberry pi is a mini-sized computer sepertik credit card berplugin to a computer or television and use standard keyboard also mouse to use it. Raspberry pi is able to allow people-people of all ages to explore the computing, and learn how to program in a language like python, it is able to do everything you'd expect from a desktop computer to do it like internet

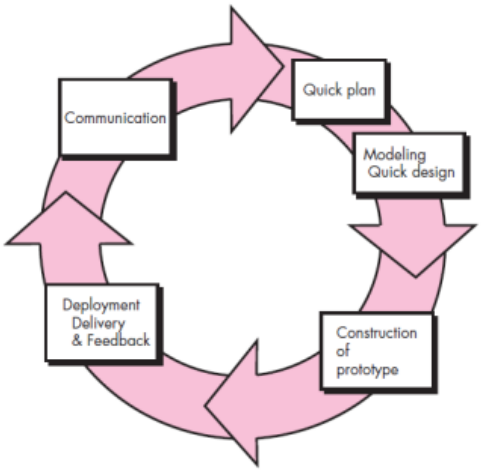
browsing play video games in high definition to create a spreadsheet. [4]
RaspberryPi in this research are used as monitoring device that provides information via the internet so that it can be received by an application that has been provided

1.5 Solar Energy

Solar energy refers to the energy of the radiation in the form of heat and light emitted by the Sun. Without the energy coming from the Sun, our planet will not be able to support life and solar energy is the most abundant form of energy that is available on our planet. Solar energy has great potential and a lot of solar technologies are evolving very quickly.
Solar energy is a renewable energy source is the most important (basically wind energy also comes from solar energy), and the only geothermal energy and tidal energy are not getting them from the Sun. Many people use the term solar energy and solar power as a synonym though it contains errors because the solar power refers to the conversion of sunlight into electricity (in many cases using photovoltaics) [7].

1.6 Prototype

Prototype is a model of the begining (original model), which became an example of raw, to be used as an example to be learned or developed. Prototype is a system or device that will be made in this research. [1]



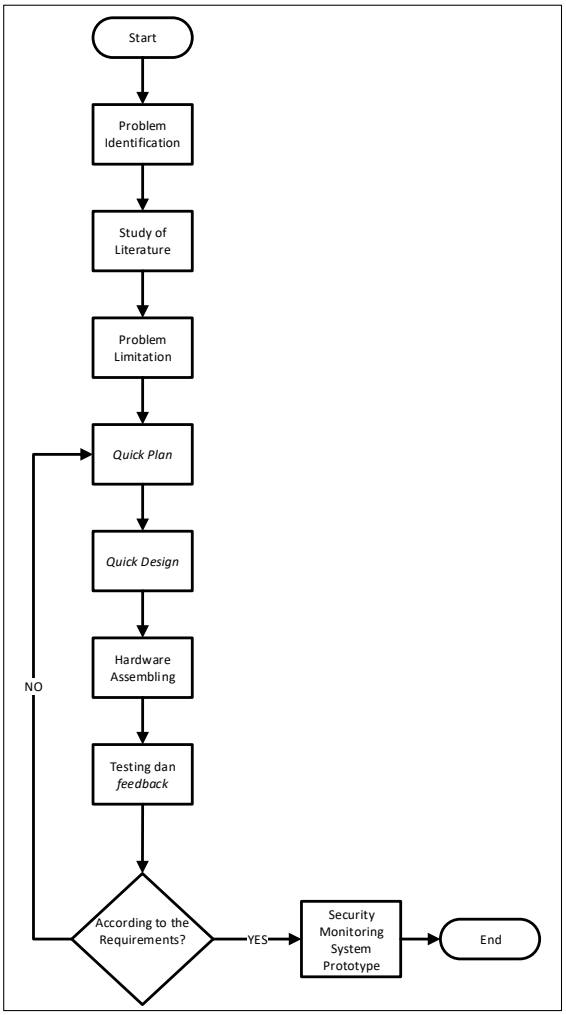
Gambar 1. 1 Prototype

Prototyping is a method of the construction of a device or system or a life cycle using protoyping (life cycle using prototyping) is a method of life cycle system based on the concept of the model work (working model). The goal is to develop a model of the final system. This means that the system will be developed faster than traditional methods and the cost will be lower. There are many ways to memprotoyping, as well as with their use. Typical of the methodology is a developer of the system (system developer), clients, and users can see and experiment with the part of the computer system since the beginning of the development process.

2. THE CONTENT OF RESEARCH

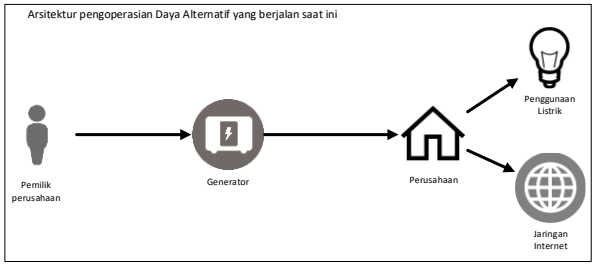
2.1 Kerangka Penelitian

The template of the research in this study serves as a reference of the steps that needs to be done to achieve the goals and purpose of the research. For more details you can see in the image below



2.1 Analysis of the exiting system

Conventional power backup system architecture currently run manually by the Manager of the company, namely by means of powering a generator set (Genset) to meet the needs of the company, that will be described in Figure 2.2

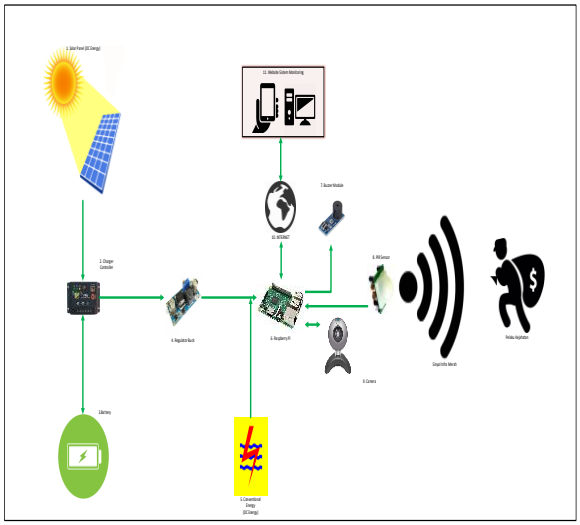


System architecture above explain how manager of the company turn on generator set as a alternative power backup, with an explanation on the following points:.

1. when a power outage occurs the Manager had to turn on the generator first to use electric alternatives.
2. Generator set (Genset) will continue on for needed or during a power outage occurs.
3. The Genset will distribute energy to the devices used in the company.
4. One of the important devices in this company is the gold scales to support the operations of buying and selling in this company.
5. Turn on the modem the internet to get the wifi to be able to check the market price every day.
6. Turn on the lights in order to check the authenticity of the money from the buyer.

2.2 System architecture to be built

System architecture to be built are the stages to get an overview of the system to be built. In terms of tools or applications that will be used by the user. Picture of system architecture can be seen in Figure below.



Arsitekutr system above describes how the system will be run later to penjelasnya will be in detail on the following points:

1. Solar panels would receive power from the Sun.

2. Power is received will be stored in batteries that have previously passed the Charge Controller in order to save power in accordance with the battery capacity.

3. Because of the power from the solar panel is DC currents will be on lowering voltage regulator plug to fit with the needs of the device.

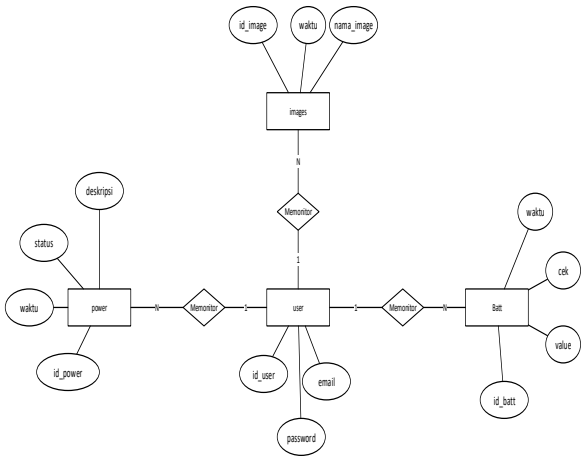
4. If the power of PLN still on then the power that will be used is the power of the PLN, when there is a blackout then the power is automatically berlaih to alternative power i.e. batteries.
5. After getting power the microcontroller will work, and enable all the sensors and actuators on the circuit.

6. All monitoring results data from the device will be in uplod via the internet and will be stored in a database and will be displayed in the web interface to perform the monitoring

Microcontroller will send information into online applications monitoring every sensor has detected a condition in the room.

2.3 Database Analysis

From the results of the analysis, there are data to be used in the process of building this application. Then from the data acquired, built a data base design and other design features. To design the data base used entity Relational diagrams (ERD) as in picture in picture Diagram of Entity Relationship :

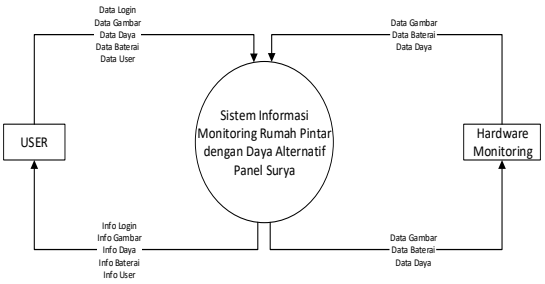


Kamus Data ERD

User	{id_user, email, password}
Images	{id_image, nama_image, waktu}
Power	{id_power, status, waktu, deskripsi }
Batt	{id_batt, value, waktu, cek}

2.4 Diagram Konteks

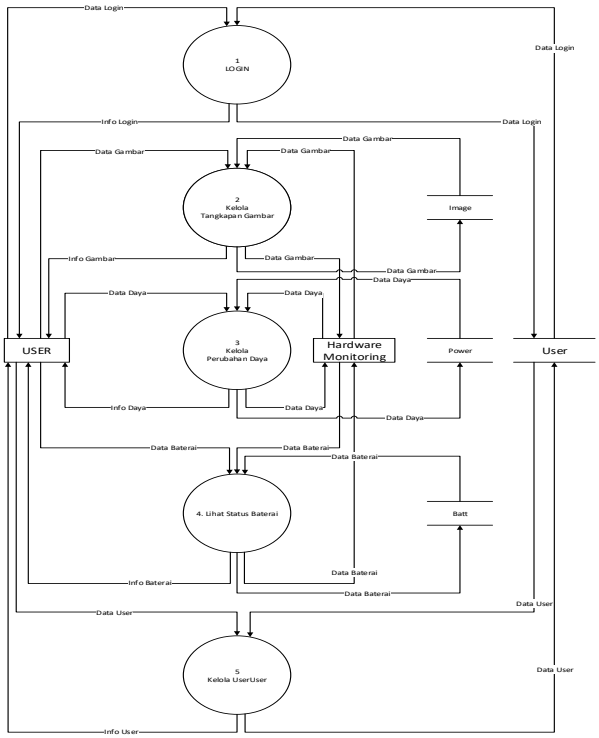
Diagram of the context for the development of this monitoring system can be seen in Figure bellow:



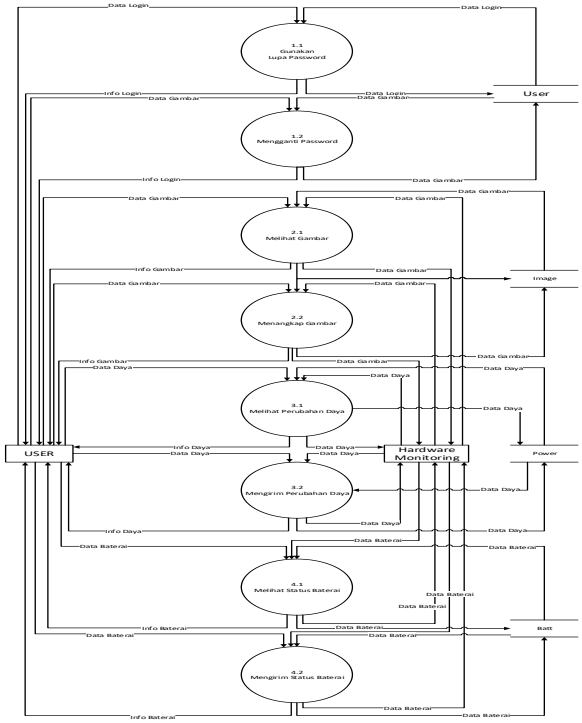
2.5 Data Flow Diagram

Data Flow Diagram (DFD) is a detail of the context Diagram serves to clarify the process and data flow running on the system to be built.

2.5.1 Data Flow Diagram Level 1



2.5.2 Data Flow Diagram Level 2



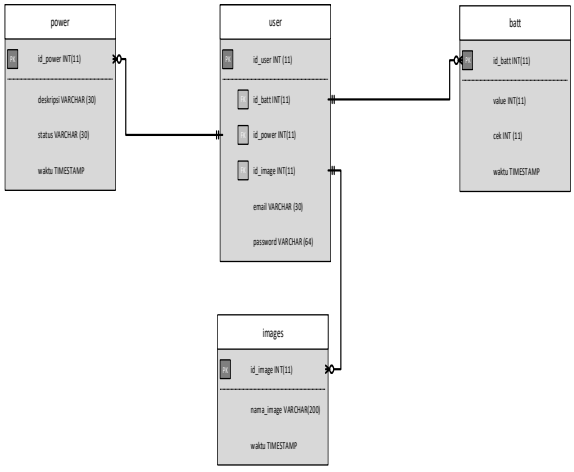
2.6 System Design Analysis

System design analysis phase starts after the system has been done. The design can be defined as the planning and making of representations, sketches or settings of some separate elements into a unified whole and functioning.

This stage concerns the confirmation of component parts of the software and hardware of a system so that after the installation of the system will be completely satisfactory banar of architecture which has been set at the final stage of system analysis

2.7 Relationship Scheme

Scheme relation is the order of each field from a database that has a relation to each other, to show the interconnectedness of this application can be seen in Figure bellow



2.8 System Testing

System testing is the most important thing that aims to find the mistakes or shortcomings in the application to be tested. The test aims to find out the application made in accordance with the performance meets the design objectives. Testing will be done is by way of a test with testing and black box testing hardware.

2.8.1 *Black Box* Testing

Black Box testing performed on the development side that log all errors and problems in usage. Black box testing focuses on the functional requirements of the software consists of a plan of testing and test results of the case.

2.8.2 Scenario of *Black Box* Testing

Testing Case	Testing Detail	Testing Type
Login	Login User	*Black Box*
Lupa Password	Send email reset password	*Black Box*
Data Monitoring Gambar	View Image Data Delete Image Data	*Black Box*
Data Monitoring Daya	View Power Data Search Power Data Delete Power Data	*Black Box*
Status Baterai	View Battery Status Check Battery Status	*Black Box*
Data Pengguna	Add User Data Search User Data Delete User Data	*Black Box*

Testing done against all existing functions in applications such as in table 2.1, of the number of times the test is performed with the menginputkan the right data and the data of the wrong system provides a different response, so when users use this application will know whether the system is running well or not.
For one example done can be seen in the following table

Kasus pengujian Lupa Password:

Testing Case and Result (Data True)			
Action / data input	**Expected**	**observations**	**summary**
Input email that is not registered on database	Show Notification “Peringatan : silahkan cek email anda”	Appear Notification “Peringatan : silahkan cek email anda”	[√] accepted [ ] refused
TestingCase and Result (Data False)			
Action / data input	**Expected**	**observations**	**summary**
Empty email field	Show Notification “Please Fill Out This Field”	Appear Notification “Please Fill Out This Field”	[√] accepted [ ] refused
Input email with wrong email	Show Notification “Peringatan : Email belum terdaftar”	Appear Notification “Peringatan : Email belum terdaftar”	[√] accepted [ ] refused

2.8.3 *Black Box* Testing Conclusions

Based on the results of the Black Box testing has been done then it can be inferred that functionally the whole process on a Prototype Monitoring system security "Toko Emas Family S" Based Internet Of Things has been running as expected.

2.9 *Beta* Testing

Beta testing is the testing that was done objectively where tested directly by users (store owner), using an interview regarding the response of the user against the monitoring system has been built.

2.9.1 *Beta* Testing Scenario

Beta testing is done by placing the test directly in the place of research using the User Acceptance Test Engineering application acceptance testing, namely by the user by way of doing a test against a number of system functions, additionally also done by the method of interview shown to the store manager Toko Emas Family S with questions based on the purpose of the research, so the questions become clear and purposeful. As for the question are given as follows:

1. Whether these systems assist in the monitoring Toko Emas Family?
2. Does this system functionality is already good and worth it?
3. How does your response regarding the presentation of the monitoring information on this system?
4. How to display the system as a whole?
5. What is the power from the solar panels that are stored in the batteries for backup power useful?
6. Is this monitoring system is in compliance with the needs?

2.9.2 *Beta* Testing Result

Based on the interview questions which had been presented, here is the answer from the store manager of the Toko Emas Family S i.e. Lian Esalianty.,A.Md.Keb. that can be seen in table bellow

Pertanyaan	Jawaban
Whether these systems assist in the monitoring Store Gold Family?	Yes, this system is a great help to monitor the State of the store, let alone be able to remotely and via the Internet
Does this system functionality is already good and worth it?	Yes, fungsionality that presented in this monitoring system is already good and deserves to be applied.
How your response regarding the presentation of the monitoring information on this system?	From the displayed image is very clear, moreover there are features such as the change of power to monitor how often does a blackout, I as the store manager feels very satisfied with this system.
How the Interface of system overall?	the interface of system is very easy to use and not too complicated to menjalankanya, just stay lit the system monitoring and application monitoring from live websites that have been created from a distance though.
What is the power from solar panels in store in batteries for backup power useful?	Certainly very useful, if there were no power outages backup monitoring system will certainly die, when the system die a theft right we can not know.
Is this monitoring system was compliance with the requirements?	Very appropriate, if seen from the needs I have ever acknowledged at the time of the first interview times.

2.9.3 *Beta* Testing Result

Based on the results of Beta testing by the method of User Accepted Test, interviews with managers Toko Emas Family S the conclusion that can be drawn:

1. Monitoring system by utilizing internet access as the recipient of the information is very helpful in doing the monitoring store.

2. Monitoring system equipped with additional power this solar panel becomes a value added so that the monitoring system can continue to run the break of blackout, so no need to kahawatir the system will die if there is a blackout, because the monitoring system will continue to run with the battery in the content by the solar panels.

3. Monitoring system that provides information about the power used and the battery status make it easier for users to find out the used battery capacity without having to look directly to the place of the hardware installed.

4. Monitoring system makes monitoring more simple places of business of the store instead of having to use the services of a person to keep the store as long as 7 of 24 hours, because it can be monitored

remotely and always give a report on the shop owner via email, which later can be viewed in an application website.

2.10 Hardware Testing

After all the components installed, the circuit components and sensor already connected and the program finished in the store in Raspberry Pi, the next step is testing the hardware. Hardware testing comprises testing passive infrared sensor (PIR), camera, Buzzer, conventional power sources, alternative power sources, solar panels, and the LED lights up. This test is done to find out whether the tool can work as its function or not and knowing how small errors that occur when data retrieval.

2.10.1 Hardware Testing Scenario

The hardware is tested one by one from the start sensor, actuator, and supporting tools on the monitoring system of the prototype has been built. This testing is done by way of testing it directly, one of the cntoh done can be seen at the table to find out how far the Passive Infrared sensor (PIR) can detect.

Experiment	Conclusions of Detection Range (m)	Readed
Attempt 1	1	Yes
Attempt 2	3	Yes
Attempt 3	5	Yes
Attempt 4	7	Yes
Attempt 5	9	No

In the table above testing is performed repeatedly, the first experiment testing done at a distance of 1 metre in front, on the left side and on the right side of the sensor PIR to know anyway how wide these sensors can detect.
These tests are repeated until the PIR sensor installed on the monitoring system could not detect the sensor again, stop detecting at a distance of approximately 8-9 metres.

2.10.2 Hardware Testing Conclusion

Of all the hardware testing that is done can be drawn the conclusion that all the hardware perngakat prototype monitoring system is well underway and has sesua its expected.

3. CLOSING

Based on the results obtained from the research that has been done in the preparation of the final project which refers to research purposes, then it can be inferred that.

1. The tool is expected to be a monitoring system that could grow owners of Toko Emas Family in watching its business at a time when the place was abandoned when night or holiday.
2. This appliance into an alternative solution Monitoring devices more affordable alternate power with solar panels that act as cadangaan for power monitoring system in order to keep it running at a time when a power outage occurs.

BIBILOGRAPHY

[1] S. R, Modul Pembelajaran Perangkat Lunak (Terstruktur dan Berorientasi Objek), Bandung: Modula, 2011.
[2] D. Kho, "TE (Teknik Elektronika)," 01 06 2016. [Online]. Available: teknikelektronika.com. [Accessed 14 03 2017].
[3] B. R. a. J. Goerzen, Foundation of Python Network Programming, apress, 2014.
[4] W.Donat, Raspberry Pi The Complete Manual, Imagine Publishing, 2014.
[5] R. H. Zain, "Sistem Keamanan Ruangan Menggunakan Sensor Passive Infrared (PIR) Dilengkapi Kontrol Penerangan Pada Ruangan Berbasis Mikrokontroler Arduino dan Real Time Clock," vol. Vol.6 no .1, 2013.
[6] D. Siagian, "Energi Surya, Solusi Masa Depan," MedanBisnis, 01 12 2013. [Online]. Available: http://www.alpensteel.com/article/115-102-energi-matahari--surya--solar/5895-energi-surya-solusi-energi-masa-depan. [Accessed 30 05 2017].
[7] I. G. N. N. Santhirasa and I. G. B. W. Kusuma, "Kajian Energi Surya Untuk Pembangkit Listrik," Kajian Energi Surya Teknik Elektro, vol. 4 No.1, 2005.
[8] Adafruit, "How Raspberry and GPIO works," 6 2015. [Online]. Available: www.learn.adafruit.com.

[9] A. Haris, "Memasang Solar Home System atau PLTS Mini Untuk Rumah," 28 12 2015. [Online]. Available: agusharis.net.